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明 細 書

1. 発明の名称

生理用タンポン挿入具

2. 特許請求の範囲

(1) タンポンを収納するための外筒および前記タンポンを前記外筒の先端開口部から押し出すため前記外筒の内部に摺動可能に挿入された内筒とから構成され、前記外筒はその後部内側に第1係止突起を有し、前記内筒は大径筒部材およびこれに摺動可能に挿入された小径筒部材から構成され、前記大径筒部材はその先端開口部外側に前記第1係止突起と係合する第2係止突起およびその後端開口部内側に第3係止突起を有し、前記小径筒部材はその先端開口部外側に前記小径筒部材が後方向へ引き出されたとき前記第3係止突起と係合する第4係止突起および第5係止突起を有し、前記第5係止突起は前記第4係止突起と近接対向する後側に前記第3係止突起が介在し得る間隔をおいて設けられている生理用タンポンの挿入具において、

前記大径筒部材はその先端開口部内側に前記小径筒部材が前記大径筒部材の先端開口部の方向へ移動するのを阻止するための第6係止突起を有し、前記第5係止突起は前記第4係止突起よりも高く突出せずかつ前記小径筒部材の後方向へ漸次低くなるように傾斜して不動に設けられ、前記小径筒部材の後端開口部は少なくとも前記大径筒部材の後端開口部よりも径大に形成された拡開部を有することを特徴とする前記挿入具。

(2) 前記小径筒部材は、これが後方向へ引き出されるまでは、前記第6係止突起が前記第4係止突起と前記第5係止突起との間に位置することにより軸方向への移動を阻止されている特許請求の範囲第1項記載の挿入具。

(3) 前記第4係止突起に対向する前記第5係止突起の内側面は前記小径筒部材の外側面に対して実質的に垂直である特許請求の範囲第2項記載の挿入具。

(4) 前記第3係止突起の高さと前記第4係止突起の高さとは実質的に等しい特許請求の範囲第1項

記載の挿入具。

(5) 前記第5係止突起の高さは前記第4係止突起の高さよりも低い特許請求の範囲第1項記載の挿入具。

(6) 前記第5係止突起は少なくとも対向位置に二個設けられている特許請求の範囲第1項記載の挿入具。

(7) 前記第4係止突起は前記第5係止突起に対向する位置に凹欠部を有する特許請求の範囲第1項記載の挿入具。

(8) 前記第1、第2、第3および第6係止突起はそれぞれが位置する前記筒部材の外周に環状に設けられている特許請求の範囲第1項記載の挿入具。

(9) 前記大径筒部材および前記小径筒部材は前記外筒よりも軟質の合成樹脂から作られている特許請求の範囲第1項記載の挿入具。

### 3. 発明の詳細な説明

(産業上の利用分野)

本発明は、経血を吸収し腔腔を閉塞するタンポ

これに摺動可能に挿入された小径筒部材4とから構成されている。そして、大径筒部材3の後端部にはその内側への切り起しによる部分突起5とその内側の環状突起6とが形成される一方、小径筒部材4が後方向へ引出されたとき、部分突起5の弾性に抗してこれ乗り越えてこれと環状突起6との間に位置する環状突起7が小径部材4の先端部外周に形成されている。また、第8図および第9図には別態様を示してあり、この態様の挿入具は、基本的には第6図および第7図に示す態様と同じであるが、大径筒部材3が後方向へ漸次小径に形成されるとともに、その後端部の内周に環状凹溝8が形成される一方、小径筒部材4が後方向へ引き出されたとき、環状凹溝8に嵌入する環状突起9が小径筒部材4の先端部外周に形成されている。

特公昭60-27303に開示された挿入具は、第10図および第11図に示すように、基本的には第6図ないし第9図に開示された挿入具と同じであるが、小径筒部材4の先端部外周に突起11と、その後方

ンを該腔腔に挿入するのに用いる挿入具に関する。

(従来技術)

従来、この種の挿入具として、タンポンを収納するための外筒と、タンポンを前記外筒の先端開口部から押し出すためその内部に摺動可能に挿入された内筒とからなるものが実用に供されている。しかし、これは全体としてかなり長やかさばるので、包装、携帯に不便である。

したがって、かかる不便を解決するため、前記内筒が大径筒部材およびこれに摺動可能に挿入された小径筒部材からなり、使用時、前記小径筒部材を引き出すことにより前記小径筒部材の先端部と前記大径筒部材の後端部とが自動的に連結されるように該先後端部に係止突起が設けられたものが、実公昭59-9821号公報および特公昭60-27303号公報において提案されている。

実公昭59-9821に開示された挿入具においては、第6図および第7図に示すように、外筒1に摺動可能に挿入された内筒2は、大径筒部材3と

向へ間隔をおいて外側の対向位置にかつ突起11側へ向く部分突起12が形成される一方、小径筒部材4が後方向へ引き出されたとき、突起11と部分突起12との間に位置する突起13が大径筒部材3の後端部の内側に形成されている。

図中15は引き出し用紐16を有する公知のタンポンを示す。

(発明が解決しようとする問題点)

(1) 一般に、この種の挿入具においては、前記外筒1は、腔腔に挿入して用いるから、処女膜を裂傷しない程度の比較的小さい外径、例えば、直径10~13mmの円筒に形成される一方、これに収納されるタンポンは、経血を可及的多量に吸収して膨張しかつ腔腔を閉塞し得るように、吸収性の良い材料を可及的に多く使用する必要があるため、その挿入状態においてその外周が外筒1の内周に密接する程度に、比較的嵩のある吸収材料を円棒状体に圧搾成形される。したがって、外筒1に収納されたタンポが内筒2により押し出されるとき、内筒2が或る程度の抵抗を受ける。さらに、外筒

1の腔口への挿入を容易ならしめるため、前記公知挿入具にも見られるように、外筒1の先端部がタンボンの押圧によって拡開する花弁状分割片によって閉じられている挿入具においては、その拡開のための押圧による抵抗も加わる。さらにまた、タンボンを腔腔に挿入するときの使用者の姿勢によっては、タンボンが腔壁に衝突することによっても抵抗が生じる。要するに、前記内筒の押圧操作によりタンボンを腔腔の所定部位に挿入するとき、その挿入から終了までの間に、大なり小なりの抵抗が内筒2にかかる。したがって、内筒2を構成する大径筒部材3と小径筒部材4との係合連結状態は、前記抵抗に耐えるのに充分に強固である必要がある。

一方、比較的外径の小さい外筒1は、腔腔に挿入するものであるから、可及的に柔軟性が高くかつ所要強度の材質と肉厚を要する材料で成形<sup>され</sup>必要がある。さらに、当然のことながら、大径筒部材3は外筒1に挿入し、かつ小径筒部材4は大径筒部材3にそれぞれ挿入し得る径に成形される必要

よりこれが環状凹溝8から抜脱して前記タンボンの押出操作をなし得なくなるおそれがある。

一方、第10図、第11図に開示された挿入具においては、第6図ないし第9図に開示された挿入具の前記問題点に加え、次のような問題点がある。すなわち、不使用時、大径筒部材3から小径筒部材4が引き出されていない状態では、部分突起12がその弾性に抗して大径筒部材3の内面により押圧伏倒せしめられているが、かりに比較的弾性の良い合成樹脂で小径筒部材4（部分突起12を含む）が成形されたとしても、前記押圧伏倒状態が比較的長期間に及ぶと、部分突起12が疲労してその伏倒癖が付与されて、原形に復帰し得なくなり、その結果、部分突起12が突起13に係合し得なくなるおそれがある。ちなみに、前記挿入具に挿入されたタンボンの製造時から使用者の手に渡って使用されるまでの期間が数月になることが屢々ある。また、首尾よく前記係合がなされたとしても、部分突起12の突起13に対する押圧力により部分突起12が小径筒部材の押圧方向とは反対方向へ

があり、さらにまた、小径筒部材4の内径はタンボンの引き出し用紐を挿通する必要がある。したがって、大径筒部材3、小径筒部材4、突起5、12等の肉厚は比較的薄くならざるを得ない。ちなみに、大径筒部材3、小径筒部材4は、合成樹脂で成形する場合、前記必要上から略1mm以上の肉厚にすることは実際上困難である。

しかるところ、第6図および第7図に開示された挿入具においては、タンボンの挿入時、前記抵抗を受ける大径筒部材3と小径筒部材4との係合連結部、特に環状突起6の押圧力を直接受ける部分突起5は、略1mm以上の肉厚にすることは困難であるから、その押圧力により小径筒部材4の押圧方向へ折曲または折損してタンボンの押出操作をなし得なくなるおそれがある。また、第8図および第9図に開示された挿入具においても、環状凹溝8に対する環状突起9の嵌入は、大径筒部材3の弾性に抗してなされてはいるが、その嵌入操作が容易になされる程度であるから、その状態は決して強固とはいえず、環状突起8の押圧力に

起され、その結果、部分突起12の先端部が大径筒部材3の外周から突出して小径筒部材4が外筒1に挿入し得なくなるおそれがある。

かくて、前記公知挿入具は、大径筒部材3と小径筒部材4との係合連結状態が確実になされ、かつ、前記抵抗に充分に耐えるように強固であるとはいえない。

(2) 前述のように、タンボンの押し出し操作に際しては、内筒2に大なり小なりの抵抗がかかるので、一般に使用者の指先を当接すべき内筒2の径が小さくその後端開口部が小さいと、その押圧操作が容易ではない。しかるに、内筒2が大径筒部材3と、これに挿入された小径筒部材4からなる挿入具においては、内筒2が単一本からなる場合よりも、小径筒部材4の後端開口部の径が小さくなるので、前記欠点がさらに増大するが、その欠点を解決するための手段が採られていない。もっとも、第6図ないし第10図から明らかなように、小径筒部材4の後端部外周に環状補強リブが設けられてはいるが、該リブ程度の径では前記欠点を解

決することにはなり得ない。また、前記欠点を解決し得る径に形成すると、後述するところから理解されるように、大径筒部材3および小径筒部材4による内筒2の組み立てが不可能になる。

(3) 前記公知挿入具は、第6図、第8図および第10図から理解されるように、不使用時、小径筒部材4が大径筒部材3と係合していないので、挿入具の組み立ておよび外筒1へのタンポンの収納がすべて完了した状態で、これを個別包装する場合などにおいて、小径筒部材4がみだりに大径筒部材3の内筒を軸方向に移動して該包装作業に支障を来たすことがある。

本発明の目的は、主として、前記公知の挿入具のような構造を有しながら、前記(1)ないし(3)のような欠点を解決することができる挿入具を提供することにある。

(問題点を解決するための手段・実施例)

本発明の生理用タンポン挿入具は、前記基本的には、タンポンを収納するための外筒および前記タンポンを前記外筒の先端開口部から押し出した

有すること；前記第5係止突起は前記第4係止突起よりも高く突出せずかつ前記小径筒部材の後方向へ漸次低くなるように傾斜して不動に設けられ、前記小径筒部材の後端開口部は少なくとも前記大径筒部材の後端開口部よりも径大に形成された拡開部を有することの特徴とする。

さらに、本発明は、次の事項を好ましい実施態様とする。すなわち、本発明においては、前記小径筒部材は、これが後方向へ引き出されるまでは、前記第6係止突起が前記第4係止突起と前記第5係止突起との間に位置することにより軸方向への移動を阻止されていること；前記第4係止突起の内側面は前記小径筒部材の外側面に対して実質的に垂直であること；前記第3係止突起の高さと前記第4係止突起の高さとは実質的に等しいこと；前記第5係止突起の高さは前記第4係止突起の高さよりも低いこと；前記第5係止突起は少なくとも対向位置に二個設けられていること；前記第4係止突起は前記第5係止突起に対向する位置に凹欠部を有すること；前記第1、第2、第3、

め前記外筒の内部に摺動可能に挿入された内筒から構成され、前記外筒はその後部内側に第1係止突起を有し、前記内筒は大径筒部材およびこれに摺動可能に挿入された小径筒部材から構成され、前記大径筒部材はその先端開口部外側に前記第1係止突起と係合する第2係止突起およびその後端開口部内側に第3係止突起を有し、前記小径筒部材はその先端開口部外側に前記小径筒部材が後方向へ引き出されたとき前記第3係止突起と係合する第4係止突起および第5係止突起を有し、前記第5係止突起は前記第4係止突起に前記第3係止突起が介在し得る間隔をおいて設けられている。

かかる構成は、既述したところから明らかなように、公知の挿入具の基本的構成と実質的に同じである。

本発明は、かかる構成において、次の要件を備えることを特徴とする。すなわち、本発明においては、前記大径筒部材はその先端開口部内側に前記小径筒部材が前記大径筒部材の先端開口部の方向へ移動するのを阻止するための第6係止突起を

第4および第6係止突起はそれぞれが位置する前記筒部材の外周に環状に設けられていること；前記大径筒部材および前記小径筒部材は前記外筒よりも軟質の合成樹脂から作られていることを好ましい実施態様とする。

さらに、本発明を図示の実施例に基づいて説明すると、以下の通りである。

第1図ないし第3図に示すように、挿入具は、タンポン15が挿入された外筒21と、これに摺動可能に挿入された内筒22とから構成されており、かつ、ポリエチレンなどの合成樹脂で成形されている。

外筒21は、タンポン15の押し出しで拡開する花弁状分割片23によって閉じられ、後端部が小径に形成されることにより生じた環段差状の係止突起24と、後端開口部に外周に環状リブ25とを有する。タンポン15の使用時、外筒21の係止突起24とリブ25との間の小径部を使用者が指先で摘持するようにしてある。ただし、外筒21は、場合によっては、第10図に見られるように、後端部に小径部

が設けられていなくてもよい。

内筒22は、大径筒部材26と、これに摺動可能に挿入された小径筒部材27とから構成されている。大径筒部材26は先端開口部の外周に環状の係止突起28を有し、これが係止突起24と係合することにより外筒21から後方向への抜脱を阻止されている。さらに、大径筒部材26は、先端開口部の内周に環状の暫定的係止突起29と、後端開口部の内周に環状の係止突起30とを有している。小径筒部材27は、先端開口部の外側に対向位置する凹欠部31を除く部分が弧状に連続する係止突起32と、その後側にそれと間隔をおいて、しかも対向位置に断面形が不等辺三角状で内側面が垂直か僅かに凹曲する不動(固定)の係止突起33とを有している(第3図参照)。かく凹欠部31を形成する一方、その対向位置に係止突起33を形成してあることは、小径筒部材27の成形後にこれを金型から抜脱し易くする。第4図に示すように、係止突起32は係止突起30と高さが実質的に等しく、係止突起33は、小径筒部材27が後方向へ引っ張られたとき係止突

が、そしてかく作られていることは限定されない。

#### (作用)

前述のような構成を有する挿入具においては、タンポンの不使用时、第1図に示すように、小径筒部材27は、大径筒部材26の内部にあって、係止突起28が係止突起32と33との間に位置して軸方向への移動を阻止されている。しかし、この阻止状態はタンポンの不使用时の移動を阻止するための暫定的なものであって、タンポンの使用に当り、小径筒部材27が後方向へ引っ張られると、係止突起32が係止突起29を比較的容易に乗り越える。かく乗り越え得るのは、係止突起29が前記阻止のための必要最小の高さに、好ましくは弧状に形成され、しかも大径筒部材26と小径筒部材27とは、比較的硬質とはいえ、合成樹脂筒体で若干の弾性を有するからである。かくて軸方向に摺動可能になった小径筒部材27がさらに後方向へ引っ張られると、第2図ないし第4図に示すように、係止突起33が係止突起30を乗り越えると同時に、係止突起

30を乗り越えることができるようにするため、係止突起32よりも低いうえに後方向へ漸次低くなるように傾斜し、係止突起32と33との前記間隔は係止突起29または30が介在し得る寸法に形成されている。さらに、小径筒部材27は、後端開口部にラッパまたはホッパー状の径大に形成された拡開部34を有している。拡開部34はその径が少なくとも小径筒部材27の後端開口部の径よりも大きく、好ましくは大径筒部材26の後端開口部の径と等しいか若干大きく形成される。また、拡開部34は、小径筒部材27が大径筒部材26にその先端開口部から挿入されたのち、小径筒部材27の後端開口部を加熱成形器に押し当てることにより形成される。なお、拡開部34は、第5図に示すような形状であってもよい。

外筒21は腹腔に対する剛性感を少なくする一方、内筒22を構成する大径筒部材26および小径筒部材27はこれらの係合連結を強固にする必要から、前者は比較的軟質の合成樹脂、後者は比較的硬質の合成樹脂で作られていることが好ましい

30が係止突起32と33との間に位置する。係止突起33が不動であるにもかかわらず係止突起30を乗り越えるのは、係止突起32が係止突起29を乗り越える前記理由から理解されよう。

#### (発明の効果)

本発明挿入具によれば、以上のように、タンポンの不使用时、タンポンを押し出すための内筒を構成する大径筒部材と小径筒部材とが暫定的に係合することにより、前記小径筒部材が前記大径筒部材の内部を軸方向へ移動することがないから、挿入具の個別包装作業などに支障を来すことがない。また、大径筒部材の後端開口部の内側の係止突起に係合する前記小径筒部材の先端開口部の外側の係止突起を不動(固定)に形成してあるから、前記小径筒部材の径方向に弾性的に変形するように構成された公知挿入具のような欠点、すなわち、前記大径筒部材の後端部と前記小径筒部材の先端部との係合連結の不安定、不確実または不可能などを未然に防止することができるとともに、そのためタンポンの押し出し操作にかなりの抵抗

がかかっても、その操作を確実に行うことができる。しかも前記操作は前記小径筒部材の後端開口部に拡張部が形成されていることによりさらに容易になる。それは、前記拡張部は使用者の指先との接触範囲が広いので、これに指先を当接しての前記操作が容易になるからである。また、前記拡張部は、かりにタンポンの不使用時における前記大径筒部材と前記小径筒部材との前記暫定的係合が確実になされないことがあったとしても、前記小径筒部材が前方向へ移動して大径筒部材に没入するのを阻止することができ、また、その没入に対する不安をなくすることができる。

かく本発明によれば、前記内筒が前記大径筒部材と前記小径筒部材とから構成される挿入具において、その改良手段が簡単であるにもかかわらず著効を奏し、実用に供しきわめて有益である。

#### 4. 図面の簡単な説明

第1図は本発明のタンポン挿入具であって、内筒を構成する大径筒部材と小径筒部材とが係合連結されていない状態の部分断面図、第2図は同上

の係合連結状態の部分断面図、第3図は同上の係合連結状態の部分破断斜視図、第4図は同上の係合連結部分の拡大断面図、第5図は小径筒部材の後端拡張部の別の態様を示す断面図である。

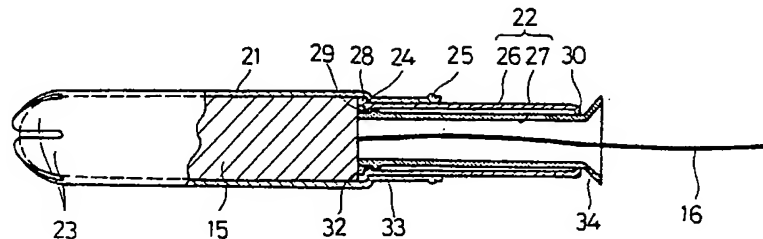
第6図、第8図は、従来のタンポン挿入具であって内筒を構成する大径筒部材と小径筒部材とが係合連結されていない状態の部分断面図、第7図、第9図は同上の係合連結状態の部分断面図、第10図は同上の別態様であって、前記係合連結がなされていない状態の断面図、第11図は同上の係合連結状態の断面図である。

- |              |              |
|--------------|--------------|
| 21... 外筒     | 22... 内筒     |
| 24... 第1係止突起 | 26... 大径筒部材  |
| 27... 小径筒部材  | 28... 第2係止突起 |
| 29... 第6係止突起 | 30... 第3係止突起 |
| 31... 凹欠部    | 32... 第4係止突起 |
| 33... 第5係止突起 | 34... 拡張部    |

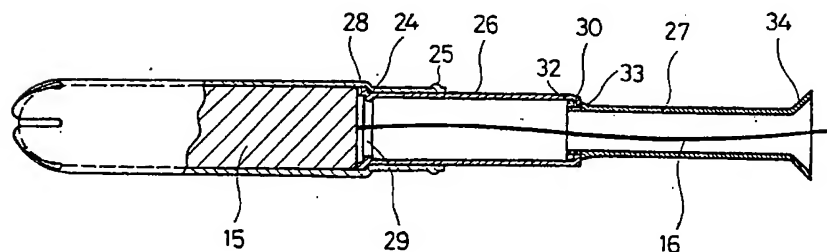
代理人弁理士 白 浜 吉 治



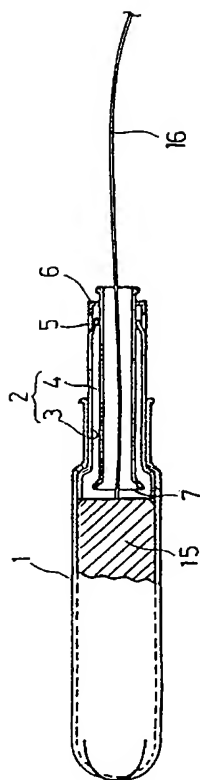
第 1 図



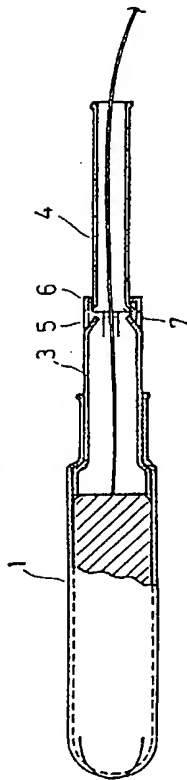
第 2 図



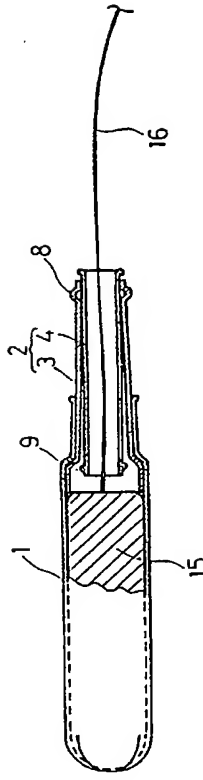
第 6 図



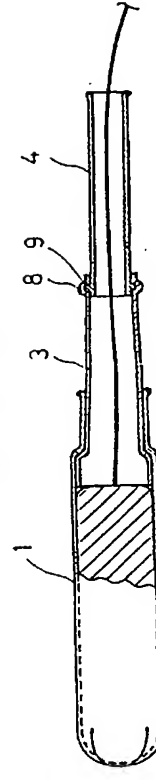
第 7 図



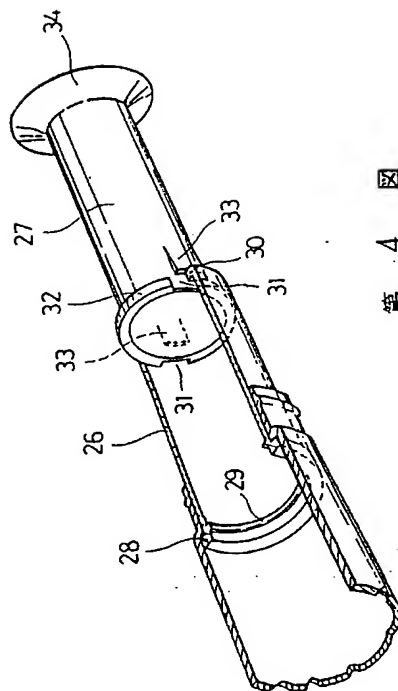
第 8 図



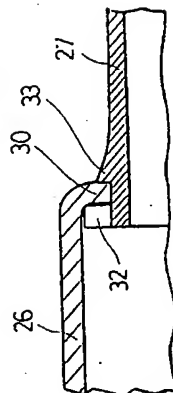
第 9 図



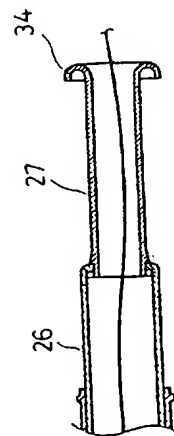
第 3 図



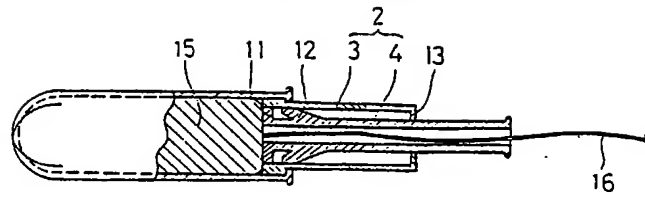
第 4 図



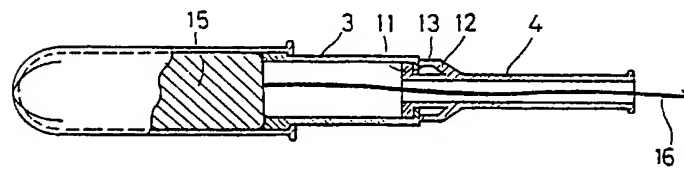
第 5 図



第 10 図



第 11 図





# United States Patent [19]

Suzuki et al.

[11] Patent Number: 4,921,474

[45] Date of Patent: May 1, 1990

## [54] SANITARY TAMPON APPLICATOR

[75] Inventors: Migaku Suzuki; Yamamoto Masamitsu, both of Kawanoe, Japan

[73] Assignee: Uni-Charm Corporation, Ehime, Japan

[21] Appl. No.: 259,895

[22] Filed: Oct. 19, 1988

### Related U.S. Application Data

[63] Continuation of Ser. No. 163,803, Mar. 3, 1988, abandoned, which is a continuation of Ser. No. 919,100, Oct. 15, 1986, abandoned.

### [30] Foreign Application Priority Data

Oct. 18, 1985 [JP] Japan ..... 60-234283

[51] Int. Cl.<sup>5</sup> ..... A61F 13/20

[52] U.S. Cl. .... 604/16; 604/18

[58] Field of Search ..... 604/14-18, 604/904

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Primary Examiner—C. Fred Rosenbaum

Assistant Examiner—Sharon Rose

Attorney, Agent, or Firm—Fred Philpitt

## [57] ABSTRACT

A sanitary tampon applicator comprises an outer sleeve to accommodate a tampon and an inner sleeve slidably telescoped into the outer sleeve to extrude the tampon through a front open end of the outer sleeve, the inner sleeve comprising a first inner sleeve member and a second inner sleeve member slidably inserted into the former and a rear end of the former and a front end of the latter are automatically interlocked by pulling the latter rearwards in use of the tampon.

9 Claims, 5 Drawing Sheets

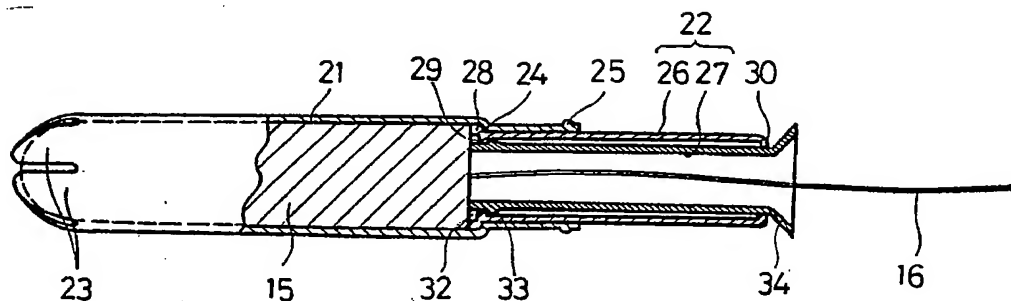


FIG. 1

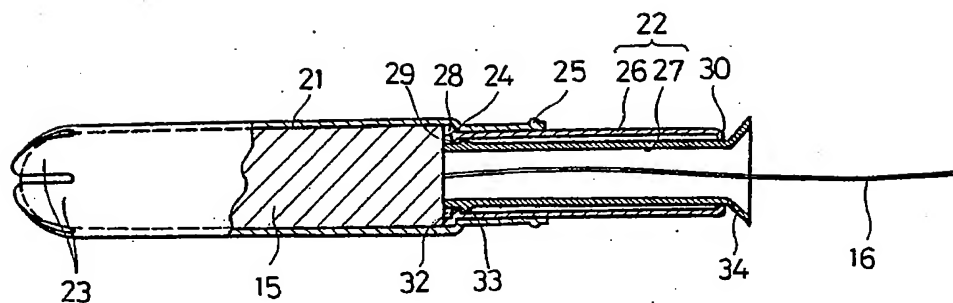


FIG. 2

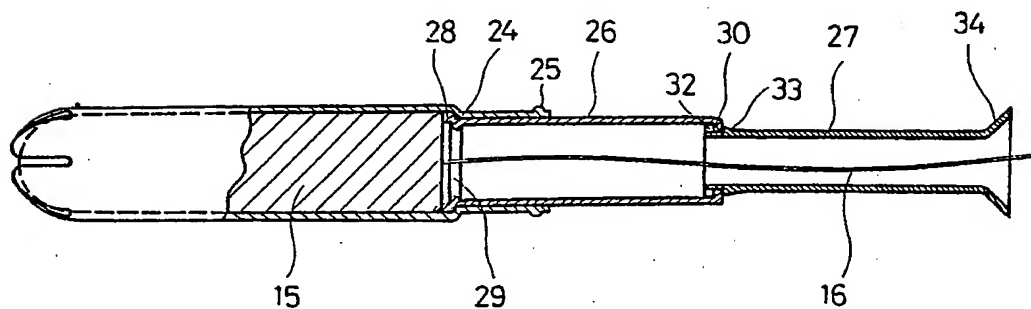


FIG.3

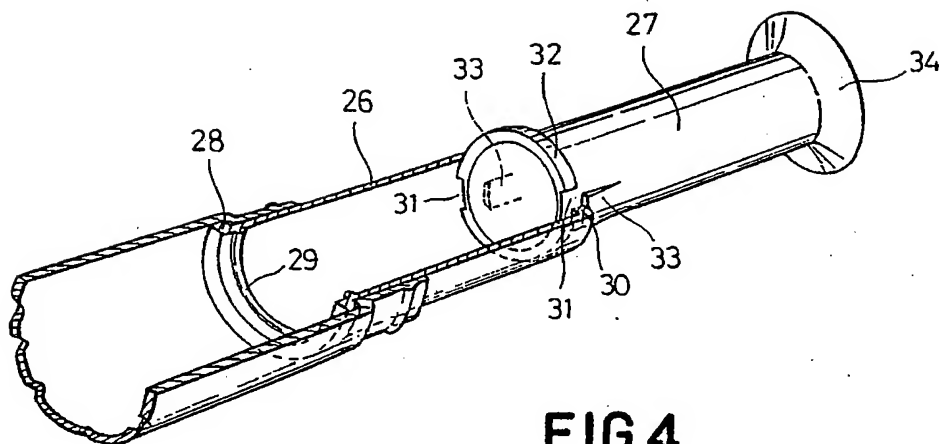


FIG.4

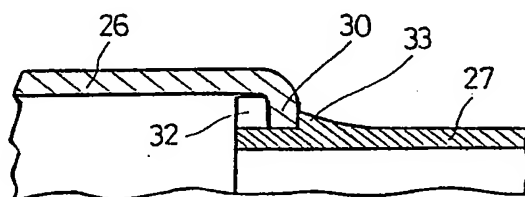


FIG.5

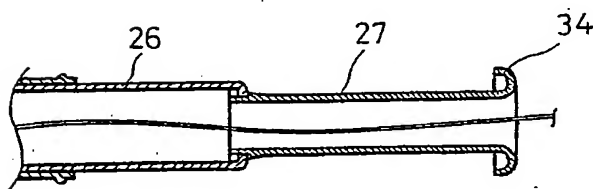


FIG. 6

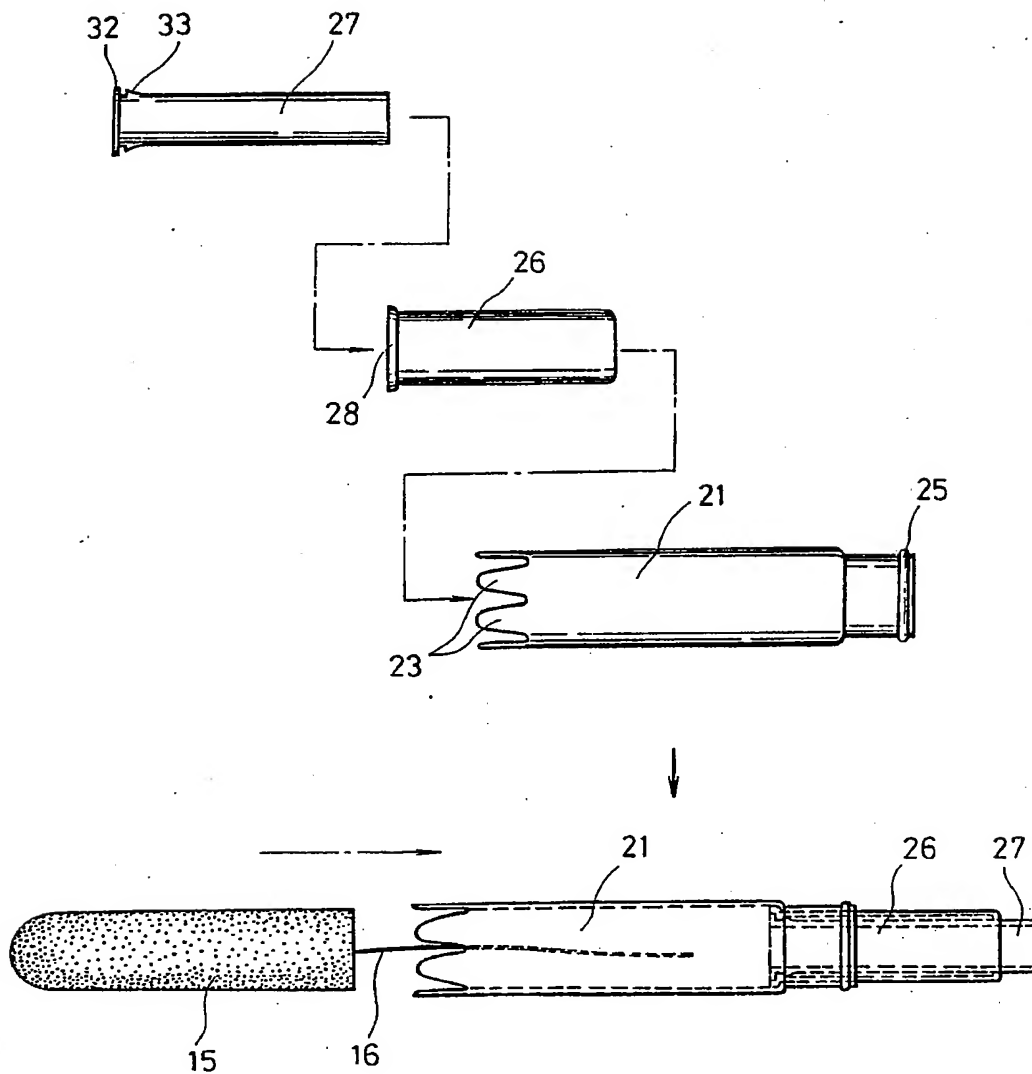


FIG.7

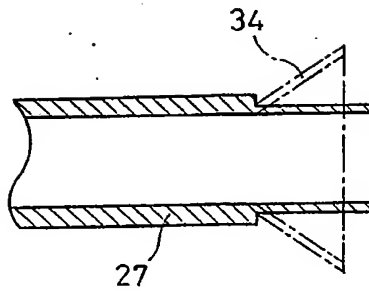


FIG.8

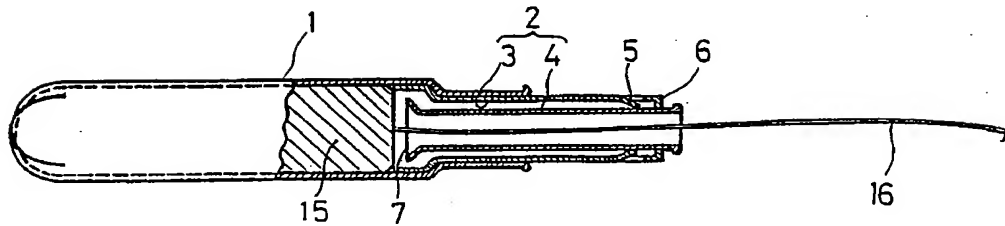


FIG.9

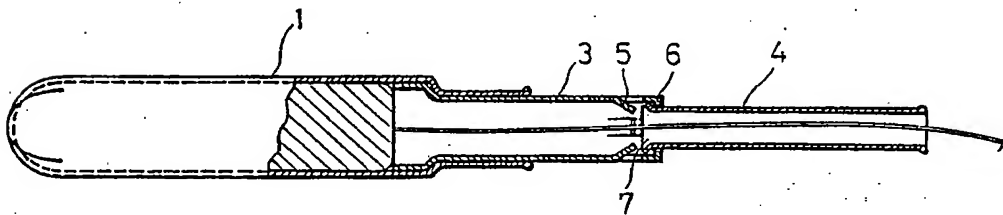


FIG.10

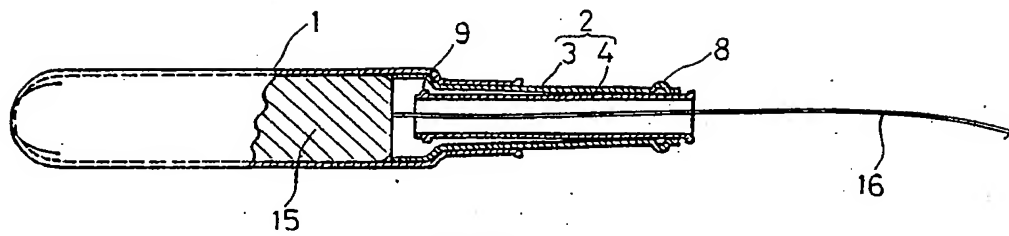


FIG.11

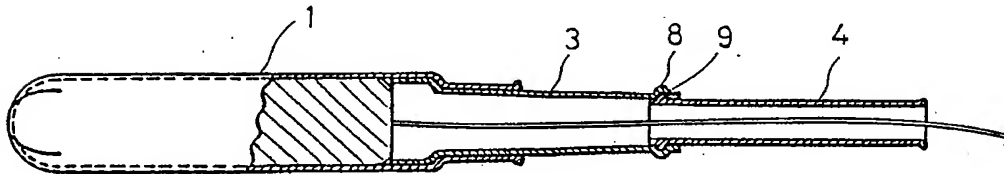


FIG.12

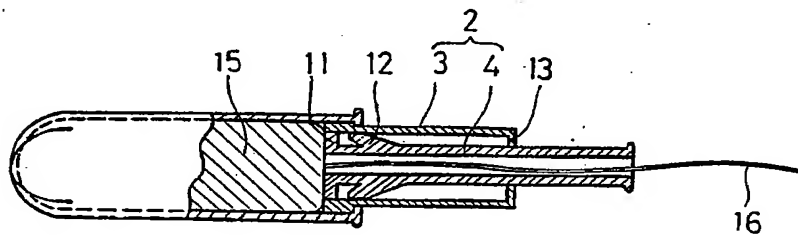
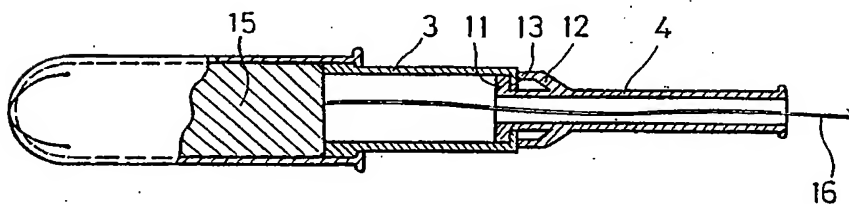


FIG.13



## SANITARY TAMPON APPLICATOR

This is a continuation of Ser. No. 163,803, filed Mar. 3, 1988, now abandoned, which in turn of continuation of application Ser. No. 919,100, filed 10/15/86, now abandoned.

### BACKGROUND OF THE INVENTION

The present invention relates to applicator used to insert a tampon into vagina, thereby to absorb menstrual blood and to clog said vagina.

As the applicator for this purpose, there has already been used in practice the construction comprising a plastic outer sleeve adapted to accommodate therein a tampon and a plastic inner sleeve slidably telescoped into the outer sleeve so as to extrude the tampon through a front open end of the outer sleeve. However, such applicator of well known art tends to be bulky in its length and inconvenient for packaging as well as for being carried with user.

To overcome such inconvenience, the improved applicator has been proposed, as disclosed by Japanese Utility Model Publication No. 59-9621 and Japanese Patent Publication No. 60-27303, in which the inner sleeve comprises a first inner sleeve member and a second inner sleeve member slidably telescoped into the first inner sleeve member, and a rear end of the first inner sleeve member and a front end of the second inner sleeve member being provided with stoppers so that these rear and front ends are automatically interlocked by pulling the second inner sleeve member rearwards in use of a tampon.

The applicator disclosed by Utility Model Publication No. 59-9621 is shown by FIGS. 8 and 9. FIG. 8 is a fragmentary section illustrating the applicator of prior art as a first inner sleeve member and a second inner sleeve member constituting together the inner sleeve are not interlocked, and FIG. 9 is a view similar to FIG. 6 but illustrating the applicator as said sleeve members are interlocked. A plastic inner sleeve 2 slidably telescoped into a plastic outer sleeve 1 comprises a first inner sleeve member 3 and a second inner sleeve member 4 slidably inserted into the first inner sleeve member 3. The first inner sleeve member 3 is provided adjacent and at the rear end with projections 5 formed by partially cutting and bending inwards the material and the annular projection 6 directed radially inwards, respectively, while the second inner sleeve member 4 is provided at its front end with the annular projection 7 circumferentially extending around the outer periphery thereof so that the annular projection 7 may ride across said projection 5 against elasticity thereof and be interposed between the projections 5 and the annular projection 6 when the second inner sleeve member 4 has been completely pulled rearwards.

The variant of this well known construction is illustrated by FIGS. 10 and 11 corresponding to FIGS. 8 and 9, respectively. This variant is basically similar to the construction as illustrated by FIGS. 8 and 9 except that the first inner sleeve member 3 is gradually diameter-reduced rearwards and provided on the inner periphery at its rear end with the annular groove 8 while the second inner sleeve member is provided on the outer periphery at its front end with the annular projection 9 adapted to be engaged in said annular groove 8 when the second inner sleeve member 4 has been completely pulled rearwards.

The applicator disclosed by Patent Publication No. 60-27303 is shown in FIGS. 12 and 13 corresponding to FIGS. 8 and 9. The applicator is fundamentally similar to those as illustrated in FIGS. 8 through 11, as will be apparent from FIGS. 12 and 13, except that a second inner sleeve member 4 is provided on the outer periphery of its front end with projection 11 and, with a spacing axially behind the projection 11, non-annular projections 12 diametrically opposed to each other and directed towards the projection 11 while the first inner sleeve member 3 is provided on the inner periphery at its rear end with the projection 13 adapted to be interposed between the projection 11 and the non-annular projections 12 when the second inner sleeve member 4 has been pulled rearwards.

Referring to these figures, reference numeral 15 designates the conventional tampon including the pull-chord 16.

In such applicator, it has been general in practice that the outer sleeve 1 is formed as a cylindrical piece having a relatively small diameter, for example, of 10 to 13 mm so as to be inserted into vagina without any damage of vaginal membrane and the tampon 15 accommodated in this outer sleeve is formed as a round rod by compressing relatively bulky absorbent so that the outer periphery of the tampon may be in close contact with the inner periphery of the outer sleeve 1 when inserted thereinto in view of requirement that the tampon should absorb menstrual blood as plenty as possible and effectively clog vagina by swelling. Accordingly, the inner sleeve 2 is encountered by a certain degree of resistance when the tampon is extruded by the inner sleeve 2 through the front end of the outer sleeve 1. Such resistance is further enhanced by a pressure necessary to spread the petal-like segments normally closing the front end of the outer sleeve 1. It should be understood that these petal-like segments are measures to facilitate insertion of the outer sleeve 1 into the opening of vagina and employed by the previously mentioned applicators of the prior arts. Furthermore, depending upon the posture taken by user during inserting the tampon into vagina, the tampon may strike against vagina wall and cause a resistance. In any cases, the inner sleeve 2 is encountered by more or less resistance during a period from inserting the tampon through the opening of vagina to final positioning it into the desired location within vagina by extruding operation of said inner sleeve. It is important, therefore, that the interlocking effect to be established between the first inner sleeve member 3 and the second inner sleeve member 4 constituting together the inner sleeve 2 should be sufficiently stable to overcome said resistance.

The outer sleeve 1 of a relatively small diameter should be molded from material as soft as possible and correspondingly requiring adequate strength and thickness because the outer sleeve 1 is destined to be inserted into vagina. As it will be obvious, the first inner sleeve member 3 should be of a diameter sufficiently small to be inserted into the outer sleeve 1 and the second inner sleeve member 4 should be of a diameter sufficiently small to be inserted into the first inner sleeve member 3. The inner diameter of the second inner sleeve member 4 must be adequate to enable the pull-chord to pass therethrough. With a consequence, the first inner sleeve member 3, the second inner sleeve member 4, the projections 5, 12 and others should necessarily have relatively small thicknesses. It is practically difficult, for the reason of said requirements, to mold the first inner

sleeve member 3 and the second inner sleeve member 4 of thicknesses larger than approximately 1 mm from synthetic resin. (1) With the applicator as illustrated by FIGS. 8 and 9, it is practically difficult to mold the interlocked portions of the first inner sleeve member 3 and the second inner sleeve member 4 which are subject to said resistance during insertion of the tampon, particularly the non-annular projections 5 destined to be directly subject to the pressure of the annular projection 6 with a thickness larger than approximately 1 mm, so the non-annular projections 5 may sometimes be bent or broken in the direction of said pressure, making operation of tampon extrusion impossible.

Also with the variant disclosed by FIGS. 10 and 11, the annular projection 9 is certainly engaged in the annular groove 8 against the elasticity of the first inner sleeve member 3, but this engagement is never stable and the annular projection 9 may be easily disengaged from the annular groove 8, making said operation of tampon extrusion impossible, because said engagement is easily established.

The applicator illustrated by FIGS. 12 and 13 is accompanied with, in addition to the above-mentioned problem, further problems as will be described below. In non-use, i.e., in the state that the second inner sleeve member 4 is still not pulled rearwards, the non-annular projections 12 remains yielding to a pressure exerted by the inner side of the first inner sleeve member 3 against the spring of the non-annular projections 12 themselves. Even when it is assumed that the second inner sleeve member 4 (inclusive of the non-annular projections 12) has been molded from synthetic resin of relatively high elasticity, said condition of yielding to the pressure lasting for a relatively long period may cause a fatigue in the non-annular projections 12 and, in consequence, said yielding may be fixed, so that the non-annular projections 12 may not restore their initial positions and, as a result, may not be engaged with the projection 13. There often elapse several months from the date of fabrication of the tampon to the actual use thereof by user, and this problem of fatigue is serious in view of this fact. Even if said engagement has been achieved, the pressure of the non-annular projections 12 exerted on the projection 13 may possibly lift the non-annular projections 12 in the direction opposed to the direction in which the pressure of the second inner sleeve member 4 is exerted, resulting in that the tips of the non-annular projections 12 protrude above the outer periphery of the first inner sleeve member 3 and the second inner sleeve member 4 can not be inserted into the outer sleeve 1.

In this manner, said applicators of the prior arts are far from the desired condition that the interlocking effect between the first inner sleeve member 3 and the second inner sleeve member 4 is reliable and stable sufficiently to overcome said resistance.

(2) Concerning the operation of tampon extrusion, the inner sleeve 2 is necessarily subject to more or less resistance as has been previously mentioned, this operation become difficult when the diameter of the inner sleeve 2 and particularly of its rear open end against which user's finger bears is small. Such inconvenience is further serious for the inner sleeve 2 consisting of the first inner sleeve member 3 and the second inner sleeve member 4 slidably telescoped into the first inner sleeve member 3 than for the inner sleeve 2 consisting of the single member, but none of the well known applicators has employed a measure to solve this problem. Cer-

tainly, the second inner sleeve member 4 is provided on the outer periphery of its rear end with the reinforcing annular rib, as seen from FIGS. 8 through 13, but the diameter of such annular rib can not solve said problem.

(3) With the above-mentioned applicators of the prior arts, as will be understood from FIGS. 8, 10 and 12, the second inner sleeve member 4 is not engaged with the first inner sleeve member 3 and the second inner sleeve member 4 easily displaces within the first inner sleeve member 3 in the axial direction even after assembly of the applicator and charging of the tampon into the outer sleeve 1 have been completed. Such displacement of the second inner sleeve member 4 disturbs operation of individually packaging the applicators.

#### OBJECT OF THE INVENTION

Object of the present invention is to provide an improved tampon applicator having the construction similar to said applicators but free from said problems (1) through (3).

According to the applicator of the present invention is so constructed that, when the tampon is not in use, the first inner sleeve member and the second inner sleeve member constituting together the inner sleeve serving to extrude the tampon are provisionally engaged with each other so as to prevent the second inner sleeve member from axial displacement within the first inner sleeve member, facilitating the applicators to be individually packaged. The projections provided on the second inner sleeve member are stationary (fixed) and this feature is advantageous in that the problems encountered by the applicators of the prior arts in which the corresponding projections are radially deformable, i.e., unstable, or ineffective interlocking between the rear end of the first inner sleeve member and the front end of the second inner sleeve member can be avoided. Furthermore, this feature enables the operation of tampon extrusion to be reliably accomplished even though this operation is resisted by said interlocking effect to some extent. Said operation is further facilitated by providing the second inner sleeve member with the diameter-enlarged portion at the rear open end, since the diameter-enlarged portion advantageously offers a large area available for user's finger to bear thereagainst. Additionally, should said provisional interlocking between the first inner sleeve member and the second inner sleeve member be not reliably established when the tampon is not in use, the diameter-enlarged portion will prevent the second inner sleeve member from moving forward into the first inner sleeve member and eliminate anxiety for such movement.

The present invention thus provides a simple but extremely effective improvement in the applicator in which the inner sleeve comprises the first inner sleeve member and the second inner sleeve member.

#### SUMMARY OF THE INVENTION

The sanitary tampon applicator according to the present invention basically comprises a plastic outer sleeve to accommodate a tampon therein and a plastic inner sleeve slidably telescoped into said outer sleeve, said outer sleeve being provided adjacent its rear end with a first stopper directed radially inwards, said inner sleeve comprising a first inner sleeve member and a second inner sleeve member slidably inserted into said first inner sleeve member, said first inner sleeve member being provided at its front open end with a second stopper directed radially outwards so as to be engaged with



said first stopper and at its rear open end with a third stopper directed radially inwards, said second inner sleeve member being provided at its front end with a fourth stopper and a fifth stopper both directed radially outwards, said fourth stopper being brought into engagement with said third stopper as said second inner sleeve member is pulled rearwards and said fifth stopper being so spaced axially behind said fourth stopper that said third stopper may be interposed between these both stoppers when said second inner sleeve member has been completely pulled rearwards.

Such construction is basically identical to that of the well known applicators.

The present invention is characterized, in this construction, by that said first inner sleeve member is provided at its front open end with a sixth stopper directed radially inwards to retain said second inner sleeve member against moving towards the axial direction of said first inner sleeve member; that said fifth stopper is stationarily provided with a height equal to or less than that of said fourth stopper and gradually slopes down rearwards; and that the rear open end of said second inner sleeve member includes a diameter-enlarged portion of which the diameter is at least larger than that of the rear open end of said first inner sleeve member.

The present invention is preferably embodied in such a manner that said second inner sleeve member is held against axial displacement by interposition of said sixth stopper between said fourth stopper and said fifth stopper unless said second inner sleeve member is pulled rearwards; that said fifth stopper opposed to said fourth stopper has its inner side substantially normal to the outer side of said second inner sleeve member; that said third stopper has a height substantially equal to that of said fourth stopper; that said fifth stopper has a height less than that of said fourth stopper; that there are provided at least a pair of said fifth stoppers opposed to each other; that said fourth stopper has a cutaway portion at a position opposed to said fifth stopper; that said first, second, third and sixth stoppers circumferentially extend around outer periphery of said sleeve members, respectively; and that said first inner sleeve member and said second inner sleeve member are made of synthetic resin harder than said outer sleeve, and these sleeves have a suitable resilience in a diametrical direction.

#### BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary section view illustrating a tampon applicator according to the present invention as a first inner sleeve member and a second inner sleeve member constituting together an inner sleeve are not interlocked;

FIG. 2 is a view similar to FIG. 1 but illustrating the applicator as said sleeve members are interlocked;

FIG. 3 is a partially broken perspective view illustrating the applicator as said sleeve members are interlocked;

FIG. 4 is a fragmentary section illustrating the portions of the applicator interlocked, in an enlarged scale;

FIG. 5 is a sectional view illustrating another configuration of a diameter-enlarged portion at the rear open end of the second inner sleeve member;

FIG. 6 is a side view illustrating the assembly steps of a tampon, the first inner sleeve member and the second inner sleeve member.

FIG. 7 is a sectional view illustrating further configuration of the diameter-enlarged portion at the rear open end of the second inner sleeve member.

#### PREPARED EMBODIMENT OF THE INVENTION

The present invention will be described by way of embodiment in reference with the accompanying drawing.

As shown by FIGS. 1 through 3, the applicator constructed according to the present invention comprises a plastic outer sleeve 21 containing a tampon 15 previously inserted therein and a plastic inner sleeve 22 adapted to be slidably telescoped into the outer sleeve 21. These sleeves 21, 22 are molded of synthetic resin such as polyethylene and, therefore, have a suitable resilience in a diametrical direction.

The outer sleeve 21 is closed at its front end by petal-like segments 23 integral with the outer sleeve 21 and the segments 23 are spread apart from one another as the tampon 15 is pushed forward by the inner sleeve 22. The outer sleeve 21 is diameter-reduced along a length adjacent its rear end so as to form an annular shoulder 24 adapted to be engaged with a corresponding portion of the inner sleeve 22 in a manner as will be described. The outer sleeve 21 is provided at its rear open end with an annular rib 25 circumferentially extending around outer periphery thereof. The outer sleeve 21 may be held along the diameter-reduced portion extending from said shoulder 24 to said rib 25 between user's fingers when the tampon 15 is actually used. It should be understood that the outer sleeve 21 may have no diameter-reduced portion adjacent its rear open end in some cases, as seen from FIG. 12.

The inner sleeve 22 comprises a first inner sleeve member 26 and a second inner sleeve member 27 slidably telescoped into said first inner sleeve member 26. The first inner sleeve member 26 is provided at its front open end with an annular projection 28 directed radially outwards so as to be engaged with the shoulder 24 of the outer sleeve 21 and thereby to prevent the first inner sleeve member 26 from falling out from the outer sleeve 21. The first inner sleeve member 26 is further provided at its front open end with a rib 29 circumferentially extending along inner periphery thereof for a purpose of provisional locking and at its rear open end with an annular projection 30 directed radially inwards. The second inner sleeve member 27 is provided at its front open end with a pair of arc-shaped ridges 32 circumferentially extending around outer periphery thereof and separated from each other by a pair of cutaway portions 31 diametrically opposed to each other and with a pair of stationary (foxed) projections 33 diametrically opposed to each other, with spacing behind said arc-shaped ridges 32. Each of these stationary projections 33 presents a shape of in equilateral triangle in cross-section, of which the inner side is vertical or slightly concave (see FIGS. 3 and 4). Provision of said cutaway portions 31 and the projections 33 facilitates it to remove the second inner sleeve member 27 from the die after having been molded. As seen from FIG. 4, the ridge 32 has a height substantially equal to that of the projection 30, but the projection 33 has a height smaller than that of the ridge 32 and gradually slopes down rearwards so that the projection 33 may ride across the projection 30 as the second inner sleeve member 27 is pulled rearwards. Said spacing between the ridges 32 and the projections 33 is so dimensioned that the rib 29 or the projection 30 may be interposed therebetween. The second inner sleeve member 27 is provided at its rear open end with a trumpet- or hopper-shaped diame-

ter-enlarged portion 34. The diameter-enlarged portion 34 has a diameter at least larger than that of the first inner sleeve member 26 at its rear open end, preferably equal to or slightly larger than the diameter of the outer sleeve 21 at its rear open end. The diameter-enlarged portion 34 is molded by pressing the rear open end of the second inner sleeve member 27 against a heated die after said second inner sleeve member 27 has been inserted from the front open ahead of the first inner sleeve member 26 into it. It should be understood that the diameter-enlarged portion 34 may have a shape as shown by FIG. 5.

It is desired to alleviate uncomfortably rigid touch of the outer sleeve 21 for vagina, on one hand, and to assure reliable interlocking between the first inner sleeve member 26 and the second inner sleeve member 27 constituting together the inner sleeve 22, on the other hand. In view of such requirements, it is preferred that the former is made of relatively soft synthetic resin while the latter is made of relatively hard synthetic resin, although this is not essential to the present invention.

The sanitary tampon provided with the applicator of the construction as has been described hereinabove may be manufactured through steps as illustrated by FIG. 6. More specifically, the tampon 15 including the pull-chord 16 is shaped from fibrous material such as cotton, rayon, polypropylene and polyester while the outer sleeve 21, the first inner sleeve member 26 and the second inner sleeve member 27 are molded from thermoplastic synthetic resin such as polyethylene, in said configuration and construction by the shaping and molding methods of well known art, respectively. Then the first inner sleeve member 26 is inserted into the outer sleeve 21 and thereafter the second inner sleeve member 27 is inserted into the first inner sleeve member 26 or the first inner sleeve member 26 into which the second inner sleeve member 27 has previously been inserted is inserted together into the outer sleeve 21. Subsequently, the tampon 15 is inserted into the outer sleeve 21 with the pull-chord 16 being guided through the second inner sleeve member 27 and let out through the rear open end thereof. Then, the petal-like segments 23 are so bent under heating by the well known molding process to close the front open end of the outer sleeve 21.

Simultaneously, or before or after the front open end of the outer sleeve 21 is closed, the rear open end of the second inner sleeve member 27 projecting from the rear open end of the first inner sleeve member 26 is bent outwards by the heating die to form the diameter-enlarged portion 34. Formation of the portion 34 in a relatively small thickness as illustrated by FIG. 7 permits an extent of bending by pressing said rear open end of the second inner sleeve member 27 against the heating die to be visually observed and thereby significantly facilitates this molding process.

With the applicator having such construction as has been described hereinabove, when the tampon 15 is still not in use, the second inner sleeve member 27 lies within the first inner sleeve member 26 with the rib 29 being interposed between the ridges 32 and the projections 33, as seen from FIG. 1, so that the second inner sleeve member 27 is locked against axial displacement. However, such locking of the member 27 is only provisional measure in order to prevent the second inner sleeve member 27 from axial displacement within the first inner sleeve member 26 during non-use of the tampon. Specifically, the ridge 32 rather easily rides across

the rib 29 as the second inner sleeve member 27 is pulled rearwards in use of the tampon, since the rib 29 is dimensioned in the minimum height to achieve said provisional locking effect, preferably in the shape of circular arc and both the first inner sleeve member 26 and the second inner sleeve member 27 have a suitable resilience, although these members are made of relatively hard synthetic resin. When the second inner sleeve member 27 thus released to be axially slidable is further pulled rearwards, the projections 33 ride across the projection 30 which comes, in turn, between the ridges 32 and the projections 33, as seen from FIGS. 2 through 4. The reason for which the projections 33 can ride across the projection 30 in spite of being stationary will be readily understood from the reason for which the ridges 32 can ride across the rib 29.

What is claimed is:

1. A sanitary tampon applicator basically comprising a plastic outer sleeve to accommodate a tampon and a plastic inner sleeve slidably telescoped into said outer sleeve to extrude said tampon through a front open end of said outer sleeve, said outer sleeve being provided adjacent its rear end with a first stopper directed radially inwards, said inner sleeve comprising a first inner sleeve member and a second inner sleeve member slidably inserted into said first inner sleeve member, said first inner sleeve member being provided at its front open end with a second stopper directed radially outwards so as to be engaged with said first stopper and at its rear open end with a third stopper directed radially inwards, said second inner sleeve member being provided at its front open end with a fourth stopper and a fifth stopper both directed radially outwards, said fourth stopper being brought into engagement with said third stopper as said second inner sleeve member is pulled rearwards and said fifth stopper being so spaced axially behind said fourth stopper that said third stopper may be interposed between these both stoppers when said second inner sleeve member has been completely pulled rearwards, characterized by that said first inner sleeve member is provided at its front open end with a sixth stopper directed radially inwards to retain said second inner sleeve member against moving towards the axial direction of said first inner sleeve member; that said fifth stopper is stationarily provided with a height equal to or less than that of said fourth stopper and gradually slopes down rearwards; and that the rear open end of said second inner sleeve member includes a diameter-enlarged portion of which the diameter is at least larger than that of the rear open end of said first inner sleeve member.

2. An applicator as defined by claim 1, wherein said second inner sleeve member is held against axial displacement by interposition of said sixth stopper between said fourth stopper and said fifth stopper unless said second inner sleeve member is pulled rearwards.

3. An applicator as defined by claim 2, wherein said fifth stopper opposed to said fourth stopper has its inner side substantially normal to the outer side of said second inner sleeve member.

4. An applicator as defined by claim 1, wherein said third stopper has a height substantially equal to that of said fourth stopper.

5. An applicator as defined by claim 1, wherein said fifth stopper has a height less than that of said fourth stopper.

6. An applicator as defined by claim 1, wherein there are provided at least a pair of said fifth stoppers opposed to each other.

7. An applicator as defined by claim 1, wherein said fourth stopper has a cutaway portion at a position opposed to said fifth stopper.

8. An applicator as defined by claim 1, wherein said first, second, third and sixth stoppers circumferentially

extend around outer periphery of said sleeve members, respectively.

9. An applicator as defined by claim 1, wherein said first inner sleeve member and said second inner sleeve member are made of synthetic resin harder than said outer sleeve, and these sleeves have a suitable resilience in a diametrical direction.

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